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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/484,437	01/18/2000	Tongbi Jiang	M4065.0226/P226	9698

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EXAMINER
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MITCHELL, JAMES M

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/484,437

Applicant(s)

JIANG, TONGBI

Examiner

James M. Mitchell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-9, 11, 12, 14-20 and 33-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9, 11, 12, 14-20 and 33-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

This office action is in response to applicant's amendment filed September 20, 2004.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-9, 11, 12, 14-20 and 31-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (APA) in combination with Forray (U.S. 2002/0062923).

APA (Fig.1) discloses a semiconductor device assembly comprising: a solder mask (18) over a substrate (40), a die (12), conductive paths (28) connecting contacts (20) on said die with contacts (22) inherently in said substrate (via within perimeter portion of substrate) and an adhesive layer (18) between said die and said solder mask.

The admitted prior art does not appear to disclose process limitations as exemplified by a partially-cured adhesive layer that is at least 50% partially cured at a temperature below about 100 degree Celsius, the adhesive is a resin bismaleimide with a glassy temperature about 20-50 degrees with initiators which react at a temperature below about 100 degree Celsius, an encapsulant molded over the die or that said contacts are substantially free of contaminants outgassed from said solder mask, or that

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the partially cured adhesive has an adhesive strength sufficient to hold a die to a solder mask during subsequent package assembly processing that includes wirebonding.

However, Forray utilizes an adhesive with a glassy temperature between 20 to 50 degrees Celsius via a resin bismaleimide and further discloses a bismaleimide partially cured adhesive with a semiconductor device that remains voidless after outgassing (Abstract: "reduced void formation upon *curing*"; Paragraph 0048), and is at least partially cured at a temperature below 100 degrees, i.e. fully curable at a temperature below about 100 degree Celsius (Par. 0007, Lines 6-8; Par. 0065 Table) whereby said partially cured is further cured at a temperature above about 100 (Par. 0065, Table Paste F; cure peak is 99.16), wherein the adhesive is inherently cured at a temperature between 20 to 50 degrees higher than glassy temperature ( $T_g$ ) of said adhesive layer (admittedly by applicant, Page 6, bismaleimide  $T_g$  is 5-10 degree Celsius); and said adhesive contains an initiators (Par. 0028, Lines 9-10) which reacts at a temperature about 100 degree Celsius, and has an adhesive strength sufficient to hold a die to a solder mask (i.e. no additional adhesive is used) during subsequent package assembly processing (Par. 0065, Table; i.e. the heating process between the onset cure temperature and cure peak is a subsequent package assembly process) that includes wirebonding (Par. 0065, Table; i.e. adhesive subject to a 50% cure between onset cure and cure peak **[Specific percentage defined by applicant's Spec. Page 7 that sufficient to enable package processing]**).

It would have been obvious to one of ordinary skill in the art to form the device of the admitted prior art with the adhesive of Forray and its characteristics, in order to bond

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the chip and to eliminate void formation in the adhesive during a cure process as taught by Forray (Abstract; Par. 0047-0049) thereby providing contacts inherently free from contaminants (via limited outgassing because no voids formed in adhesive).

With respect to an encapsulant over the die, because applicant didn't timely traverse examiner's official notice of the office action filed April 2, 2003, the well-known statement has been previously deemed accepted in office action filed November 18, 2003 and further traversal on the matter has been indicated as waived.

With respect to the process limitation of claims 1-9, 11-20 and 31-36, and 40 as exemplified by "partially cured adhesive layer is partially cured at a temperature about 100 degree Celsius" and "wherein said partially cured adhesive layer is at least fifty percent cured at a temperature below about 100 degrees Celsius," are product by process claims. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself, the prior art structure is the same as the claimed invention. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985)

Furthermore, with respect to claims 1 and 12, the intended use limitation of "adhesive strength sufficient to hold said die to solder mask during subsequent package assembly processing [wirebonding]," does not result in a structural difference between the claimed apparatus and the apparatus of the prior art. Further, because the

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apparatus of the prior art, Forray, is inherently capable of being used for the intended use the statement of intended use does not patentably distinguish the claimed apparatus from the apparatus of prior art. Similarly, the manner in which an apparatus operates is not germane to the issue of patentability of the apparatus; Ex parte Wikdahl 10 USPQ 2d 1546, 1548 (BPAI 1989); Ex parte McCullough 7 USPQ 2d 1889, 1891 (BPAI 1988); In re Finsterwalder 168 USPQ 530 (CCPA 1971); In re Casey 152 USPQ 235, 238 (CCPA 1967). Also, "Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim."; Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969). And, claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danley, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does." Hewlett-Packard Co. v. Bausch & Lomb Inc., 15 USPQ2d 1525, 1528 (Fed. Cir. 1990).

### ***Response to Arguments***

Applicant's arguments filed September 20, 2004 have been fully considered but they are not persuasive. Applicant's position is that Forray does not disclose a "partially cured adhesive at or below 100 degree Celsius, quoting from Forray's specification that "curing...requires only a single step curing." A single step curing is not mutually exclusive of a partially cured adhesive. The table shown on page 4 of Forray provides examples of its adhesive. Two of the column headings explicitly are "cure onset" and "cure peak." A material that begins to cure at a temperature other than its maximum cure temperature is partially cured. Simply because it occurs in a single, continuous

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stage is not germane to whether there is a partial cure. Because Forray clearly shows support for a partial cure, applicant's argument is deemed unpersuasive.<sup>1</sup>

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 8:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone

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<sup>1</sup> In regards to applicant's footnote, the previous rejection is deemed proper. See MPEP 2144.03[R1].

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number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jmm

December 12, 2004



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